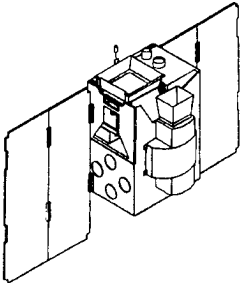


SAMPEX

Solar, Anomalous And Magnetospheric Particle Explorer

Spacecraft Sketch	Mission Objective
	The Solar, Anomalous and Magnetospheric Particle Explorer (SAMPEX) specific objectives are to: 1) determine the ionization state of the anomalous cosmic ray component to identify the source of the rays and their method of energization in astrophysical plasmas; 2) provide new information of the composition of the solar atmosphere to advance understanding of the origin of the solar system and the relation between the materials making up the sun and the planets; 3) conduct a detailed survey of relativistic electrons which plunge from the radiation belts into the atmosphere; and 4) provide unprecedented detail on the cosmic rays entering the solar system from outside sources in order to determine whether cosmic rays originate in supernovae explosions or in other types of processes in the galaxy.

TYPE OF MISSION	PROGRAM OFFICE	PROJECT LEAD CENTER	MANAGEMENT APPROACH	S/C CONTRACTOR	I&T CONTRACTOR
ASTROPHYSICS	SPACE SCIENCE & APPLICATIONS	GSFC	IN-HOUSE	GSFC IN-HOUSE	GSFC IN-HOUSE

Payload Description
The Solar, Anomalous and Magnetospheric Particle Explorer (SAMPEX) payload includes the spacecraft and four science instruments: (1) Low Energy Ion Composition Analyzer (LEICA); (2) Heavy Ion Large Telescope (HILT); (3) Mass Spectrometer Telescope (MAST); and (4) Proton Electron Telescope (PET). The SAMPEX spacecraft is designed as a single string system. Redundancy is almost non-existent; and the estimated useful lifetime of the spacecraft is about three years. The spacecraft is 3axis stabilized with the pitch axis pointed to the sun, using a solar-pointed/momentum-bias system. The solar panels provide electrical power for the operations. An on-board data processing unit preprocesses science and other data, and stores the data in a Small Explorer Data System (SEDS), before transmitting it to Wallops (or a back-up station).

INSTRUMENT NAME	ACRONYM	PI AFFILIATION	PRINCIPAL INVESTIGATOR	I&T CONTRACTOR
HEAVY ION LARGE TELESCOPE	HILT	MAX PLANCK	TBD	UNIV MD
LOW ENERGY ION COMPOSITION ANALYZER	LEICA	UNIV MD	TBD	UNIV MD
MASS SPECTROMETER TELESCOPE	MAST	CIT	TBD	UNIV MD
PROTON-ELECTRON TELESCOPE	PET	CIT	TBD	UNIV MD

Instrument Descriptions
<p>The SAMPEX Heavy Ion Large Telescope (HILT) consists of: 1) an array of position sensitive proportional counters; 2) an ionization chamber, 3) an array of position sensitive proportional counters and 4) a coplanar, 10-element, solid state array of detectors. The detectors are backed by a large CsI scintillation counter viewed by four light sensitive diodes. The two arrays of proportional counters enable computation of the exact length of the trajectory along the ionization chamber. Telemetered signals from all of the sensors enable determination of the isotopic mass, charge and energy.</p>
<p>The SAMPEX Low Energy Ion Composition Analyzer (LEICA) experiment includes four silicon solid state detectors. Ions passing through nickel entrance foils emit secondary electrons which constitute a signal to start timing. A double entrance foil prevents single pinholes from allowing sunlight to enter the telescope and provides immunity to solar and geocoronal ultraviolet. Another foil and microchannel plate assembly in front of the solid state detectors gives the signal to stop timing. The velocity determined from the path length, the time-of-flight, and the residual energy measured by the solid state detectors are combined to yield the ion mass. On-board processing determines whether the ions are protons, He nuclei, or more massive ions.</p>
<p>The SAMPEX Mass Spectrometer Telescope (MAST) is an 11 layer array of detectors, each stacked one below the other. The first four, M1 through M4, are surface-barrier, one-dimensional, position sensitive detectors, each having 92 coplanar, parallel electrode strips with 0.5 mm pitch. Following these are two more surface-barrier detectors, D1 and D2. Further downstream are lithium-drifted solid state detectors, D3 through D7. The signal from the last-penetrated detector measures the residual energy E, and the upstream detectors provides dE/dx with abundant redundancy.</p>
<p>The SAMPEX Proton-Electron Telescope (PET) consists of an array of eight, lithium-drifted solid state detectors. The instrument can be operated in a low gain (high-Z) mode or in a low-Z mode for observation of protons, electrons, and helium. Pulse height from the last-penetrated detector enables determination of total energy, and the upstream detectors enable accurate determination of particle type. The counting rate resolution of 0.1 seconds enables observation of rapid-time variations in the flux of precipitating electrons with energies above 0.4 MeV.</p>

Launch
<p>7/13/92(SPX) 6/15/95(SW S) 7/15/95(FST)</p>